12 Lead ECG Review

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ISCHEMIA & INFARCTION PATTERNS
Normal ECG
Myocardial Areas

I

II

III

aVR

aVL

aVF

V1

V2

V3

V4

V5

V6

Inferior

Septal

Anterior

Lateral
Evolution of an MI

• Direct changes
  – T wave changes - Ischemia
    • Peaked
    • Inverted
  – ST changes - Injury
    • Depression
    • Elevation
  – Q wave develop – Infarction

• Reciprocal changes
  – Opposite of changes in the direct leads
  – Mirror image
ST Segment

• Measure 0.08 sec after the J-point
ST Elevation

- mm above the isoelectric line
ST Depression

- ST Depression seen in
  - Non-STEMI
  - Reciprocal changes
  - Angina
Q wave

- An initial negative deflection is the Q wave
- There are normal Q waves such as is common in Lead II
Pathological Q wave

- A pathological Q wave must be:
  - 0.04 seconds wide
  - At least 1/3 the overall height of the QRS complex
Occlusion of right coronary artery
Occlusion of the left anterior descending artery
Lateral MI

Occlusion of left circumflex coronary artery, marginal branch of left circumflex artery, or diagonal branch of left anterior descending artery.
Lateral MI
Method of Analyzing 12 lead ECG for Infarction

• Determine underlying rhythm
• Look at contiguous leads
  – Inferior wall – II, III, aVF
  – Septal wall – V1, V2
  – Anterior wall – V3, V4
  – Lateral wall – I, aVL, V5, V6
• Look at T wave and ST changes
  – T wave
  – ST segment
  – Q waves
Ischemia & Infarction Case Review
AXIS & VECTORS
Direction and Distance of Current

• Direction
  – Positive deflection
  – Negative deflection

• Distance
  – Height or depth of complex
Vectors

• Describe the direction and the distance the electrical current travels
Normal Conduction

Conduction system

- Sinoatrial (SA) node
- Atrioventricular (AV) node (junctional tissue)
- Right bundle branch
- Bachmann’s bundle (interatrial tract)
- Bundle of His
- Posterior fascicle
- Left bundle branch
- Purkinje fibers
- Anterior fascicle
Normal ECG Layout

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>aVR</th>
<th>V1</th>
<th>V4</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>aVL</td>
<td>V2</td>
<td>V5</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>aVF</td>
<td>V3</td>
<td>V6</td>
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Axis Determination

- Impulse flows from the top of the heart to the apex and from the inside of the muscle wall to the outside
- These impulses are vectors
- Vectors added together are called axis
Determining Axis

• Use only Leads I and aVF to divide the chest into 4 quadrants
  – Normal
  – Right deviation
  – Left deviation
  – Northwest or “No man’s land”

• Look at Leads I and aVF
  – Positive deflected
  – Negative deflected
Axis Determination
Normal Axis
Left Axis Deviation
Right Axis Deviation
No Man’s Land
Calculating Axis Degrees

• Identify most upright QRS
• Identify deflection of perpendicular partners
  – Lead 1 & aVF
  – Lead 2 & aVL
  – Lead 3 & aVR
• Partner has positive deflection – move 30 degrees toward lead
• Partner has negative deflection – move 30 degrees away from lead
Axis Case Review
4. Case Study – 50 year old male post PCI. He appears fatigued. His color is grayish and sallow. His wife reports general loss of appetite, loss of motivation. Patient reports general malaise. Vital signs are stable. Heart rate is bradycardic. 12 lead EKG shows the following.
BUNDLE BRANCH BLOCKS
Structure of Bundle Branches
Normal Bundle Conduction
Right Bundle Branch Block
Right Bundle Branch Block

• What 2 leads should be used to assess BBB?

• What is the QRS deflection in V1 with normal conduction?

• What is the QRS deflection in V1 with RBBB?

• What is the classic QRS pattern in RBBB?
Left Bundle Branch Block
Left Bundle Branch Block

• How is the septum depolarized? From right to left or left to right?

• Does this change with LBBB?

• What changes occur in V1 and V6 with LBBB?
Change in BBB Pattern in MI
Bundle Branch Block Case Review
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